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SPECIFIC TEMPORAL-LOBE SIGNS AND ENHANCED DELAYED CROSS-MODAL MATCHING PERFORMANCE

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Summary.—Structural damage to the amygdala severely retards delayed cross-modal (tactile-to-sight) matching in primates. Conversely, we hypothesized that people who display signs suggestive of specific temporal lobe lability should show enhanced delayed cross-modal matching performance. The hypothesis was supported. In a single experiment involving 25 subjects, significant negative correlations obtained between the numbers of errors on the cross-modal matching task and numbers of affirmative responses within clusters of items that contained themes of meaningfulness, religious beliefs or ictal, complex partial epileptic (limbic) states. On the other hand, the numbers of errors were not significantly correlated with either clusters of control items or items that are presumed to reflect the function of other temporal-lobe structures. Both matching and questionnaire data were collected under double-blind conditions.

Various validity studies for a cluster of items that are intended to measure temporal lobe signs in the normal population have been reported (Persinger & Valliant, 1985). We reasoned that more specific verification for these items should be possible by studying delayed, cross-modal matching in human subjects. Murray and Mishkin (1985) reported that amygdalectomized monkeys showed severe deficits in a delayed tactile-visual matching task. The temporal lobe hypothesis, which is an extension of Bear's (1979) sensory-limbic hyperconnection concept, predicts that high temporal lobe scores should be associated with fewer errors. There should also be discriminant validity: the strongest correlation between matching errors and temporal lobe items should involve those associated with amygdaloid function in humans. These signs primarily involve profound affective states of meaningfulness.

To test this hypothesis, one of each type of five wooden cubes were placed in different orders on 20-cm by 50-cm plywood boards. The five cubes displayed the following widths: 2 cm, 2.5 cm, 3 cm, 3.5 cm, 4 cm. Twenty-five (12 women; 13 men) second-year university students (20 to 26 yr. of age) served as subjects. They received 4% bonus marks in a course for participation in the experiment. Each subject was individually tested on the matching task while all subjects were administered the Personal Philosophy Inventory (which contains items that compose various clusters) after one-half the number of subjects had been tested. However, the questionnaire data were not analyzed until the matching data had been collected. Neither the subjects nor the experimenter were familiar wtih the nature of the experiment.

For the delayed cross-modal matching task, each subject sat across a card table from the experimenter (first author). The same instructions were read to each subject. Essentially the subjects were told that the experimenter was interested in discerning how well they can understand what they touch. A total of 20 trials were given to each subject. For each trial, the subject was instructed to place his preferred hand (palm up) through a cloth-covered device that was much like a test-panel for tactile perceptions. One of the five sizes of cubes was placed in the subject's hand for 2 sec., the block was removed, and the subject was instructed to remove his hand and to wait.

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After 20 sec. had elapsed, one of the five boards containing the five different sized cubes (one size of which the subject had handled 20 sec. before) was presented for 10 sec. only. He was instructed to point to but not touch the cube that had just been in the hand. The cube board was then removed from the subject's sight. For the next trial, another board (with a different order of the cubes) was given. The same order of boards was given for each subject, and they were never seen except during the 10-sec. matching periods. Activity during the waiting period included both rest and distraction procedures. For the first 10 trials, the subjects were instructed to wait. During the second 10 trials, the subjects were asked to calculate simple two- to four-step mathematical problems in their heads and then to write the answer down before they were shown the cube boards and asked to select the appropriate target. Each cube size was felt by the subjects equal numbers of times for each procedure.

The two major control clusters of items (normal psychological experiences and normal proprioceptive items) and the major (all temporal lobe signs) and specific (complex partial epileptic signs) clusters of items were determined for each subject. Essentially the score for each cluster was simply the sum of the affirmative responses (or their equivalent for negative answers). In addition, for discriminant validity, the following clusters (four to six items in each) were calculated: vestibular experiences, deep religious beliefs, perseveration tendencies, memory difficulties, meaningfulness, and sense of presence (Persinger & Valliant, 1985). Spearman correlations were completed between each of the temporal lobe clusters and the total numbers of errors committed during the 20 trials of the cross-modal matching task (because the numbers of errors between the first and second set of ten trials did not differ appreciably). The numbers of total errors ranged from 0 to 9; the mean was 4.5.

The correlations (all $df = 23$) between the numbers of errors and the various main clusters were: normal psychological experiences (0.08), normal proprioceptive experiences (−0.01), major temporal lobe cluster (−0.30), and complex partial epileptic signs (−0.36, $p < .05$). Correlations (in parentheses) between the total numbers of errors and scores on the other subclusters were vestibular experiences (−0.24), religious beliefs (−0.54, $p < .01$), perseveration (0.17), memory difficulties (0.26), intense bouts of meaningfulness (−0.51), and sense of presence (−0.24). Scattergrams showed the significant correlations were not due to outliers.

These results indicate that normal people who report more temporal lobe signs (complex partial or "limbic" states) showed better delayed cross-modal matching than those people who reported fewer signs. In addition, the enhanced matching was correlated most strongly with clusters of items that are suspected to represent strongly amygdaloid function in primates (specifically, feelings of meaningfulness in humans); however, items correlated with functions of other limbic structures were not as strongly correlated with the enhanced cross-modal matching. These results tend to support the idea that symptoms of sensory-limbic hyperconnectionism are associated with enhanced performance on a temporal-lobe-specific task.

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